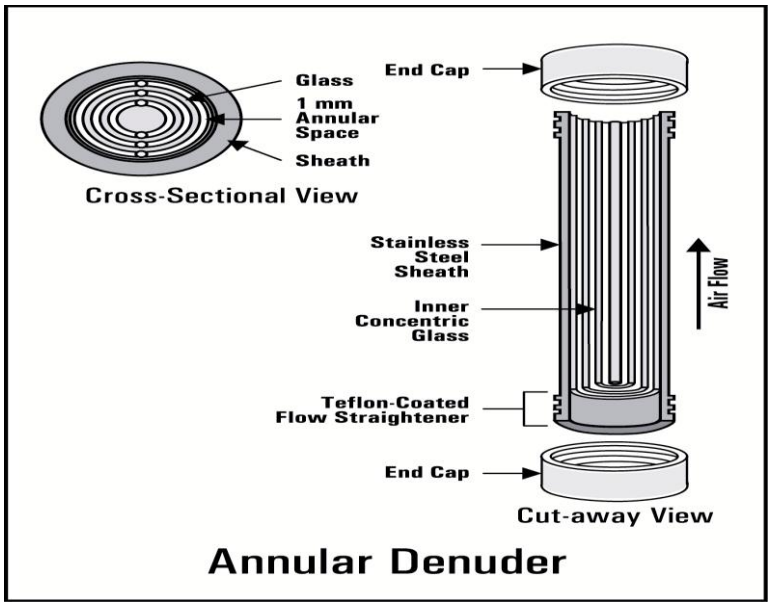
4.0 ANNULAR DENUDER SYSTEM MONITORING

4.1 Method

Annular Denuder System (ADS) monitoring was done using EPA Compendium Method IO-4.2, "*Determination of Reactive Acidic and Basic Gases and Strong Acidity of Atmospheric Fine Particles (<2.5µm)*" (Appendix D). Weekly Air Particulate Sampler (URG Corporation's[3]), Model URG-2000-01J, was used in this study. The sample collection occurs via two annular denuders and a filter pack connected in series. The annular denuders consist of concentric cylinders of chemical-coated glass that react with acidic or basic gases in the sample, see Figure 4.1. The denuders take advantage of the difference in diffusion and chemical properties of gases and particles. For example, gases such as SO_2 and HNO_3 have diffusion coefficients of about 0.15 cm/second while particles of aerodynamic size between 0.1 and 2.5 micrometer have diffusion coefficients less than 0.05 cm/second. Therefore, with laminar airflow, acidic gases passing through an annular denuder space can be selectively removed from the air stream, if the walls of the denuder are coated with an alkaline material such as sodium carbonate. The URG multi-channel denuders, used in the present study, are composed of two concentric glass tubes with a closed cylinder in the center, all of which are enclosed in a Teflon™ coated stainless steel sheath. This sheath not only prevents glass denuder breakage but also serves as a flow straightening section. The inner surfaces of these tubes are etched to provide greater surface area for coating.

Figure 4.1 Annular Denuder Internal Schematic with Cross Sectional View



[3] URG, Chapel Hill, NC, www.urgcorp.com